double stars, and to form some idea of just how an apparatus for this purpose should be constructed. As the method is evidently applicable, the apparatus is being constructed as rapidly as possible, so that regular observations may be undertaken.

The method appears to possess the following advantages:

1. The resolving power of the telescope (for double stars) is at least doubled.
2. Good seeing does not appear to be important, as the fringes were very sharp under poor atmospheric conditions.
3. Very small angular separations can be measured with an accuracy at least as great as that for larger angles.
4. The position angle can be determined as accurately for very close doubles as for those widely separated.

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THE SPECTRUM OF T TAURI

The spectrum of the variable star T *Tauri*, associated with Hind's variable nebula N. G. C. 1555, has been discussed before in these PUBLICATIONS[1] by Adams and Pease on the basis of a spectrogram whose scale is 4.1 mm. from K of calcium to $H\beta$. The spectrum has now been photographed with the one prism spectrograph attached to the 100-inch reflector. The scale is 26.2 mm. from K to $H\beta$. An exposure of 5^h30^m gave a sufficiently strong continuous spectrum to make possible the measurement of absorption lines as far to the violet as λ 4134. When photographed, T *Tauri* was probably not brighter than visual magnitude 10.

Thirty-five absorption lines give a radial velocity of + 29 km/sec. Many other lines remain to be identified, but the foregoing are among the strongest. The strong absorption lines of iron are mostly of Class III in the electric furnace. The three lines λ 4250, λ 4260, and λ 4271 show this characteristic in a rather striking manner. The arc lines (in the comparison spectrum) λ 4250 and λ 4271 are each a blend of two lines, the violet component in each case being a line of Class III and the red component a Class II line; λ 4260 is a single Class III line. In all three cases the stellar lines give consistent displacements if only Class III lines are considered. The three strong chromium lines λ 4254, λ 4274, and λ 4289 are present. Numerous calcium lines are found—that at λ 4227 being very strong with a width of more than 5 A.

[1] *These Publications*, **27**, 133, 1915.

The emission lines reported by Adams and Pease are confirmed for the most part by this spectrogram. In the table which follows are given: (1) wave-lengths of bright lines on my spectrogram; (2) wave-lengths by Adams and Pease; (3) corresponding wave-lengths in η *Carinae*[2]; (4) remarks.

BRIGHT LINES IN T TAURI

(1) Sanford λ	(2) Adams and Pease λ	(3) η Carinae λ	(4) Remarks
......	3889	......	Hζ
3934.1	3933	......	K of calcium
3969.8	3969	......	H of calcium
......	4066	......	Not identified
4102.0	4102	4101.9	Hδ
......	413	......	Not identified
......	419	......	Not identified
4233.4	4231	4233.3	Enhanced iron line
4340.4	4341	4340.6	Hγ
......	4470	......	He. Not confirmed
	4516	4515.4 4520.5 4522.7	Probably λ 4516 corresponds to a blend of three lines in η Carinae. There are maxima at this point on my plate, but they are unfit for measurement.
4549.7	456	4549.6	Enhanced iron line
4584.0		4584.0	Enhanced iron line
4629.5	463	4629.5	Enhanced iron line
4861.5	4861	4861.5	Hβ
4924.1	4923	4924.1	Enh'd iron line } Focus falls off badly here.
5019.5	....	5018.6	Enh'd iron line

This plate is not strong enough to decide the reality of the bright lines λ 3889, λ 4066, λ 413, λ 419, listed in the second column. The first two, however, appear upon a low dispersion spectrogram taken by the writer on October 5, 1918; λ 4470 of helium is not confirmed, and the probable identification of 4516 is indicated in the table. The enhanced iron lines given in the table are among the very strongest enhanced iron lines, both in the laboratory spectra and in η *Carinae*. An examination (after measurement) indicates the probable presence of still other enhanced iron lines, revealed by slight maxima in a continuous spectrum almost strong enough to blot them out. None of the emission lines in the first column is narrow. The mean width of the five lines, H and K of calcium, Hδ, Hγ, and Hβ is between 3 and 4 A. The radial velocity as derived from the bright lines in the first column (except the last, which is badly out of focus) is + 23 km/sec. The range in values

[2]*Lick. Obs. Bull.*, **8**, 55, 1913.

for the individual bright lines is greater than for the absorption lines, so that it is unlikely that the difference between the values (6 km/sec.) has any meaning.

In this connection it is of interest that King has produced with the electric furnace a continuous spectrum upon which are found bright H and K, λ 4227 as a strong absorption line, and the red components of the iron doublets λ 4250 and λ 4271 suppressed while the blue components show as absorption lines.

It is to be noted that η *Carinae* and T *Tauri* are both variable stars associated with nebulae. T *Tauri*, however, gives a relatively strong continuous spectrum, quite in contrast with η *Carinae*, in which the continuous spectrum, if existent, is excessively weak.

Because of the greater dispersion of this plate, the larger number of lines considered, and the agreement between the velocities from absorption and from emission lines, the radial velocity here derived may be considered to supplant velocities derived with the small dispersion hitherto used. Similar plates will be necessary to determine the constancy or variability of this velocity.

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OBSERVATIONS OF BARNARD'S VARIABLE NEAR MESSIER 11

On Mr. Shapley's photographs of Messier 11 the following measures have been made of Barnard's variable No. 1 (*Pop. Ast.*, **27**, 485, 1919; *Ast. Jour.* **32**, 102, 1919). The observations in July, 1916, suggest a fairly rapid increase in brightness, but the material is not yet sufficient to estimate the length of period.

Date	Photographic		Photovisual		Color
	Magnitude	No. of Plates	Magnitude	No. of Plates	Index
June 6, 1915	>16.7	1	>14.9	1	.....
June 7, 1915	16.7	1	>14.7	1	.....
July 6, 1915	15.6	1	.....	..	.....
Aug. 12, 1915	16.8	1	14.5	1	+2.3
Aug. 16, 1915	16.8	1	14.6	1	+2.2
Sept. 7, 1915	....	..	>15.0	1	.....
Oct. 3, 1915	>16.7	1	....	..	.....
July 5, 1916	15.9	2	13.3	2	+2.6
July 6, 1916	15.6	3	13.3	2	+2.3
July 8, 1916	15.0	1	13.1	1	+1.9
April 19, 1917	16.1	1	....	..	.....
Aug. 14, 1917	15.2	2	....	..	.....